THE BRAILLISTS FOUNDATION

BRAILLECAST PODCAST EXTRA 32

An Introduction To Computer Braille

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Matthew Horspool: Welcome back to Braillecast Extra. Coming up this time, An Introduction To Computer Braille, a session recorded on Tuesday, 21st September 2021, presented by James Bowden and introduced by Melanie Pritchard.

Melanie Pritchard: Good evening, and a very warm welcome from us here at the Braillists Foundation. I'm Mel Pritchard and this Masterclass this week is going to be all about computer braille, what it is and how do we use it, I think everything we're going to need to know about computer braille. I'm certainly looking forward to it.

 James, well done and welcome to you. I do know that you have lots of complicated titles. Rather than introduce you, I think I'll let you introduce yourself and tell us all about yourself and what you're going to do. Welcome, James.

James Bowden: Thank you, Mel. Well, you're very kind, such in introduction. Just call me James, that'll be fine.

 I work for the RNIB and I'm supposed to know something about braille and something about technical and that's my job title: Braille Technical Officer. So, that'll do.

 Today we are going to look at what's called computer braille. Sometimes it's called computer code but I try to avoid the term "code" because that implies that you're actually writing computer programs which we are definitely not doing tonight.

 This is computer braille. Where would you find it, why would you need it, what is it, how does it work, what are the most common signs? And indeed, we'll look at some settings in some popular screen readers, how you can actually set this up, should you need to.

 Let's get started with where you might actually encounter computer braille and I thought of four places. First of all, some modern braille note takers still require you to enter things like file names, web addresses, emails and that kind of thing in computer braille. Some braille displays will show their system messages in computer braille. I turn on my Brailliant BI braille display and the very first character is dots 1 2 5 7. So it's an eight-dot braille character. It's basically a capital H, but it is definitely in computer braille. The third one I've discovered is on some screen readers. Even if you are using contracted braille, there's an option to show the word at the cursor uncontracted, but uncontracted generally means in computer braille. So, not only do all the contractions disappear but certain other symbols like numbers and punctuation, they end looking very strange sometimes.

 The final place where you might encounter computer braille is if you're directly reading or writing a BRF or braille-ready-file. So you do not want to double-contract, if you like, when reading a braille file, a BRF file, because your results will definitely be unreadable.

 So, what is computer braille? Well, it kind of dates from the days when computers were, well, less resourceful than they are today. You had far less memory, far less disk space. Some computers didn't even have sound, back in the day. Colours on graphical screens were limited. Screens had grids of characters. All the characters on the screen were exactly the same width, whether it was a narrow print character, like an "I" or a wide print character like a "W", they all occupied the same space. You didn't actually have to be a computer programmer or attached to a mainframe computer. If you had a braille display, you would use computer code and it was really a very simple code. Every print character became exactly one braille character. So, if you look at ordinary literary braille, either uncontracted or contracted, the number 1 in braille normally takes two braille cells, the number sign and then the letter A.

 Likewise, if you're using contracted braille, any form of English contracted braille, the letters E-R, normally only take one cell, even though it's two print characters.

 Now, in computer braille, all of that disappears and every single character is uniquely one braille character. So, the digit one is just one braille cell and the letters E-R always take two braille cells.

 Now, when you have a fixed grid of characters on your computer screen, when screens used to be, for example, 80 characters wide and 25 lines down, or even only 40 characters wide and 25 lines down, this means your braille display could exactly show you precisely where every character is on the screen, because it only occupies one cell. Brilliant for computer programming because you could see exactly see how everything lined up.

 But there was another reason why computer braille was used, and this is because the literary code did not, back in the day, have all the signs needed for computers. So, computers have things like back-slashes and tildes and hash signs and dollar signs and, I don't know, vertical bars and curly braces and grave accents and goodness knows what else on your keyboard and some of those characters simply did not exist in the former literary braille code. I don't just mean Standard English Braille, I mean all the English braille codes like English braille, American edition, as well as Standard English Braille, did not have all of those signs.

 You had to either switch to a different code or write out the word. So, for example, I'm jumping ahead a little bit, you might remember, some people who used Standard English Braille, the dot 6 I-N-G sign, which used to say that what's coming would be computer braille. In the US, that sign used to be dot 4 5 6 ING, what's coming is computer braille.

 So, a little bit more, there's only other little problem. There are only six braille dots normally which means you have 64 different character possibilities. If you really want to know the maths, it's 2 to the power of 6. You've got each dot can be either there or not there and there's six dots, so that's 2 to the power of 6, 64.

 But computers, even back in the day, could show 256 different characters. How are you going to show each one uniquely? The solution is to invent two extra braille dots, called dot 7 and dot 8. Dot 7 is below dot 3, and dot 8 is below dot 6, and we have an eight-dot braille cell. This is one of the reasons why most braille displays have eight dots. It's so you can show computer braille, as well as showing a cursor or highlighting.

 The basics of computer braille are that you have one cell per character. It's an eight dot code and it can uniquely show all the signs that used to appear on a standard computer terminal.

 Even though UEB has been adopted in all the major English-speaking countries for five years now, at the time of speaking, there are still times when you will encounter computer braille. As I mentioned earlier, some braille note takers will ask you to write file names, web addresses, email addresses etc. in computer braille. Some braille displays will show their system messages in computer braille. If you're working with a BRF file, you definitely need computer braille and on some screen readers, when you don't contract the word at the cursor.

 Is there just one form of computer braille? And the answer is no. The most common form of computer braille nowadays is the USA computer braille, also known as the North American braille computer code, also sometimes called Grade 0. It has various different names. That's the code we'll be looking at tonight.

 There were other variants of it. So, the UK had its own version of computer braille. All the letters were the same, but punctuation and numbers were very different from the US. There were also different forms of computer braille in, for example, Germany, France, etc.

 So, if you have a BRF file from a non-English-speaking country, it is likely to be encoded slightly differently from a US one and you either have to change your braille settings or re-encode the file to make it readable.

 There was also variants of computer braille which don't use eight dots, but instead use only six dots. This is so you could actually emboss it on paper and what they did to cover the extra characters over the 64 limit of six-dot braille is you have special prefixes before some characters to show it was the alternate version. So the square bracket might be a particular dot combination and the curly brace would be the same dot combination but with a prefix.

 There were also prefixes to show that you are now going into computer braille and when you're coming out of computer braille. As I mentioned earlier, the dot 6, dots 3 5 6, or dot 6 I-N-G in the UK and the dot 4 5 6 I-N-G in the US, which is the going in, and in the US, they had a different sign for coming out, which is dots 4 5 6, dots 1 5 6, or dots 4 5 6, W-H sign.

 We will be concentrating in this session on the USA Computer Code, which is the most common form today.

 Are there any questions so far?

Ben Mustill-Rose: Thanks for that great introduction, James, and a great history lesson to get us going. Terry-Ann, you're good to go.

Terry-Ann Saurmann: You mentioned the four reasons for using computer braille and I was a little bit confused by the third one that you mentioned.

James Bowden: The third one is when you have a screen reader set to contracted braille, if you have the option to show the word at the cursor uncontracted, the screen reader will typically not use the Grade 1 code, but use computer braille.

Terry-Ann Saurmann: That's the one I was confused by.

James Bowden: You try it. If you write a word such as "English" with a capital E and a full stop after it, typically the dot 6 will disappear and become a dot 7 under the E and the full stop will change from dots 2 5 6 to dots 4 6.

Terry-Ann Saurmann: Okay. I've experienced that, where contractions disappear, but I guess I've not experienced it going to computer braille ever.

James Bowden: It does happen.

Terry-Ann Saurmann: Okay, very good.

Ben Mustill-Rose: Thanks for that, Terry. No more hands, so I think we're good to move on.

James Bowden: Thank you, Ben. So, if you're taking notes, now is a great time to get your note taking ready, because we're going to look at the most common signs that you might encounter in the USA braille computer code. What does it actually show?

 So, I'm not going to go through absolutely every symbol on your keyboard, just hopefully the ones that you might encounter.

 Remember, first of all, that it's an eight-dot code and every braille character is exactly one print character and every print character is exactly one braille character. So, there's no capital prefix and there's no numeric prefix etc. and no contractions either.

 The ordinary lower case letters, a to z, they are shown by your ordinary braille letters, a to z, "a" is dot 1 up to "z" is dots 1 3 5 6.

 Capital letters don't use a preceding dot 6, but instead put a dot 7 underneath. So a capital A is dot 1 and dot 7. Now if you're not used to reading eight-dot braille, it's worth doing a bit of practice, so that you don't mistake, for example, dot 1 and dot 7, which is a capital A, for dot 1 and dot 3, which is of course the letter k, but lower case.

 I think I mentioned earlier, when I turn my braille display on, the very first character is dots 1 2 5 7, so dots 1 2 5 is the letter "h" and the dot 7, there's a little gap below the dot 2 and then there's another dot 7, so it's a capital H.

 That's your lower case and upper case letters. Numbers are shown with dots 2, 3, 5 and 6. In other words, they're the same as "a" to "j", but they're written a little bit lower down. So, the number 5 is not written with a number sign then letter "e". Instead it's written dots 2 and 6, what we would normally think of as an E-N sign.

 All the other punctuation signs use other dot combination, what we would normally think of as various contractions. So, I'm going to list them and I think there's about 16 of them. That's not all of them, but hopefully it'll be the most common ones.

 The full stop or the period is dots 4 6.
The comma is dot 6 on its own.
Question mark is what we would normally think of as a T-H sign, dots 1 4 5 6.
Exclamation mark is what we would normally think of as a T-H-E sign or dots 2 3 4 6.
The colon is dots 1 5 6, or the W-H sign, we would normally call it.
The apostrophe, that's an easy one, that's dot 3 as normal.
Hyphen is another easy one, dots 3 6.
Your ordinary brackets, O-F and W-I-T-H, so dots 1 2 3 5 6 is the open round bracket and your close round bracket it dots 2 3 4 5 6. They do look quite interesting when you first encounter them.
Forward slash is dots 3 4, as it used to be in former braille codes.

 A little test, my braille display asks me, dots 1 4 7, which is a capital C, O-N-F-I-R-M, so "Confirm" and then it says O-F sign, Y, S-T sign, N, W-I-T-H sign, T-H sign. Now that looks like complete mumbo-jumbo if I read it like that. But I interpret that as the US computer code, it's open brackets, Y slash N, close brackets, question mark. Remember there are no contractions in this eight-dot computer code and every individual character is one print character.

 The percent sign is one you might well come across and it's dots 1 4 6, otherwise known as the S-H sign. So if my battery level was dot 2, dot 3 5 6, dot 3 5 6, dot 1 4 6, otherwise known as dot 2 or comma, lower j, lower j, S-H sign. But actually that really reads 100% and I don't need to worry about anything.

 Ampersand or the "and" sign, that's an easy one, that's the A-N-D sign in braille, dots 1 2 3 4 6. But remember if you see an A-N-D sign in computer braille, it is not the letters A-N-D, it is actually the "and" sign or the ampersand. On most keyboards that's upper case 7.

 So far, all those characters only use the first six dots. The next one uses dot 7. The at (@) sign, as you would type it in email addresses. The at (@) sign in the USA computer code is dots 4 7.

 Dot 7 on a braille display is often to the left of dot 3 and it also doubles as the backspace key if you press it on its own, so be slightly careful. You press dots 4 and 7 together and you'll get an at (@) sign, if you're using the USA computer code.

 I already mentioned that forward slash is dots 3 4. Computers used to use the back slash quite heavily and the back slash, in print, it's a slash that goes the other way, so a forward slash goes bottom left to top right in print and a back slash in print goes top left to bottom right. That's what it looks like in print. In braille, it's dots 1 2 5 6 7. So, it's like an O-U sign with an added dot 7, very strange sign.

 Plus (+) sign is dots 3 4 6, otherwise known as I-N-G.
Another fairly easy one to remember, the equals (=) sign is all six dots, dots 1 2 3 4 5 6, otherwise known as a F-O-R sign.

 I'm conscious that I've rambled through a fairly long list of rather arbitrary signs and I've definitely not mentioned all of them. A tip I would give is, if you're not sure what a sign is, you could just cursor onto it and let the speech tell you what it is. Great way of finding out what braille signs mean, whether you're in computer braille or indeed UEB contracted. Just get your cursor onto the character and the screen reader will also speak it to you.

 Incidentally all these signs I've been talking about are also commonly used if you've ever used what they call a braille font. So, a braille font is when you're writing a print document and rather than having print characters, you want braille dots to appear on the page, so they're actually ink, but they look like braille. So your braille fonts typically use this USA computer code, which is why I said, if you're writing directly a BRF file, it's also useful.

 I've not mentioned dot 8 anywhere in this. Dot 8 was typically used for what they used to call extended characters, which are really those which don't normally appear on a standard QWERTY keyboard. They included things like accented letters and various other strange symbols which were around.

 I think that's probably enough on all these amazing symbols. I hope I haven't frightened too many people. Do we have any questions?

Ben Mustill-Rose: Thanks, James. We're going to come to Kathleen first and then Teresa.

Kathleen Riessen: Just a query on the at (@) sign. I would have considered that as just dot 4. Why the dot 7 as well?

James Bowden: I didn't want to get into this. So, the dot 4 on its own is actually the grave accent.

Kathleen Riessen: Ah ha, thank you.

James Bowden: I'm going to go into geek speech. It goes in 32s according to the ASCII chart. So characters 32 to 63, which is space to question mark, only use dots 1 to 6. The next block which is 64 to 95 use dots 1 to 6 and dot 7. The third block from 96 to 126 or 127, they're exactly the same as 64 to 95 but without the dot 7.

Kathleen Riessen: Yep.

James Bowden: Geek speech ended.

Ben Mustill-Rose: We're going to come to Klaudia.

Klaudia Suchowiak: What was the sign after the apostrophe and before the bracket because I missed that one when I was taking notes?

James Bowden: That would probably be the hyphen, which is ordinary dots 3 6, one of the ones you would expect.

Klaudia Suchowiak: Okay, I've got that.

James Bowden: The three characters which are as you might expect are the apostrophe, dot 3, the hyphen, dots 3 6, and the ampersand, which is the braille A-N-D sign.

 I hope I haven't fried too many people's brains with these different characters. They are all in the handout which will be available after the session. You can download it from the Braillists web page.

 What I want to do next is look at the settings, where you'll find the settings to choose your braille table, in a few popular screen readers. This is definitely not going to be exhaustive, so if you ask me about Android or Macs or BRLTTY or things like that, I don't have the answer, but I will just look at some of the popular ones today.

 So we'll start with JAWS, if you have JAWS, you might want to follow along and try this out. Please don't accuse me of breaking any of your settings. You change the settings at your own risk. Always know what your settings are before you change them. That applies to all screen readers, by the way.

 In JAWS, the selection of the braille table is found in the Settings Centre, so you press Insert and the letter J to bring up the JAWS window or the JAWS menu, depending how you've configured it, and then across or down to Utilities, and then the Settings Centre. If you want the keyboard shortcuts, in an English version of JAWS, it's Insert J, U, E.

 This brings up a very large dialog of lots and lots of settings and you tab to get to the tree of settings, if you're not there already, and then you can either cursor down, arrow down, until you get to braille, or you can press the letter B to jump straight to the first item in that tree beginning with B, which is braille. It'll probably say "Braille Closed." It says "Closed" because it's a branch of a tree, as they call them, and you press cursor right or arrow right to open that branch and then cursor down once more and it says "General".

 At this point I press F6 to get across to the other pane in the Settings Centre and you'll see the actual braille settings.

 The first one is the language, for example English United States. That's what I've got mine set on, even though I'm in the UK, I actually have it set to English United States, and the reason for that is because I want to use UEB Contracted or Grade 2 UEB for when I'm in contracted braille, but I want to use the USA computer code or computer braille when I'm playing with BRF files. If I had set this to UK English, then I'd have to use the UK computer braille, which doesn't work very well with most BRF files, if they're produced in the USA code.

 So, my JAWS settings have the language for the braille set to English USA.

 Tab again and you have a list which gives you the choice whether to show braille in computer braille, USA or that is English braille American edition, Grade 1 or 2, or Unified English Braille or UEB, Grade 1 or 2. I typically flip between contracted or Grade 2 UEB and the computer braille option.

 Tab once again and you've got the option of how you want to input braille, whether you use computer braille or UEB.

 One more tab and there's the check box for whether you want to show the word at the cursor contracted. Now, that check box only appears if you are using contracted braille. If you're using computer braille, that check box is not there, because of course you can't un-contract computer braille because it is already a one for one code.

 So, those are the main settings that you need in the JAWS Settings Centre. I'm sure there are probably other ways to get to those settings, but I thought I'd give you the most complete way. There are loads of other braille settings in JAWS and I'm not going to go into them here. The Braillists did an excellent session on the JAWS braille settings at another Masterclass.

 Now, on many braille displays, you can press space and the letter G, or space and dots 1 2 4 5 and that will switch between showing computer braille and the contracted braille that you've selected. So, what I tend to do is flick that on when I want to read computer braille or BRF files and then flick it again when I want to read documents and so on.

 Note that in JAWS, even though UEB does have all the signs you need to write email and web addresses, in some applications at certain points, JAWS will insist you use computer braille for writing email addresses and web addresses. This is not strictly necessary but JAWS does it, probably because not all braille codes have all the signs in them.

 So, that's JAWS. Let's look briefly at NVDA, another very popular screen reader. If you are using NVDA, you can follow along and as I said before, if you're thinking of changing settings, please take a note of what they are currently set to, before you make the change. I don't want to be accused of messing up anybody's braille display or screen reader.

 In NVDA, from the NVDA menu, which is normally the Caps Lock + N or Insert + N or NVDA key and the letter N, you select Preferences and then Settings. This opens up a fairly large dialog with all your NVDA settings. Cursor down from General until you get to Braille, or you can just type the letter B, and then tab and you're in the braille settings. So you tab along, I think the first option is what braille display you're actually going to use and then you just keep tabbing until you find the ones for the output braille table and the input braille table. If you continue tabbing, there's the option for whether you show the word at the cursor, contracted or not. That's really all there is to it in NVDA.

 SuperNova is another screen reader, from Dolphin Computer Access, and you access their braille settings through its Control Panel which is Ctrl + Space, or Caps Locks + Space to bring up the menu version of it. You go to the braille menu and under the General Preferences, you have three list boxes, the first is for the computer braille table and the second is for what they call literary braille for output and the third is for literary braille input. Those actually just select the tables you want to use. You choose whether you want to use computer braille or literary braille in the Characters menu under Braille and under Input under Braille.

 There is sometimes a key to switch between computer and literary braille. As with JAWS, it's often Space + G on your braille display but this does vary sometimes depending on your braille display.

 Finally VoiceOver on your iOS device, for example, your iPhones, iPads, you need to go to your VoiceOver Setting which you're probably familiar with. You open Settings, find Accessibility and then VoiceOver and then finally Braille. In that page there are options for whether the input and the output are eight-dot or six-dot, eight-dot typically means computer braille and six-dot typically means a literary braille. Then there's a button for the braille table and in there you can select what braille code you want to use, for the contracted braille code.

 On most braille displays, you can press Space and the letter G, or Space and dots 1 2 4 5, to switch whether the output is shown in computer braille (eight-dot braille) or literary braille. You can press Space + lower h, or Space + dots 2 3 6, to switch whether you want to input in computer braille or input in literary braille.

 So that's a little whistle-stop tour of some of the settings in various screen readers.

 How are we doing for questions, Ben?

Ben Mustill-Rose: A comment in the chat from Carla. She's noticed that some pieces of software only support inputs as well as output in computer braille. Is that something you're familiar with and why might that be?

James Bowden: The short answer is that computer braille is very simple to program, because you have one print character equals one braille character, or run it the other way, one braille character equals one print character, so there aren't any complicated rules about if you've got two dot 6s before this, then it's the whole word in capital, or if you put a dot 3 4 5 6 before a letter a to j then it actually turns it into a number. There aren't any of these complicated rules. It's just one character in is one character out.

Ben Mustill-Rose: Thanks for that. We're going to come to Teresa.

Teresa Arroyo: I am a bit confused in something. I've been using computer braille for quite a long time. At first I didn't know it was actually computer braille. But my question is, is it possible to write through a Focus braille display in computer braille table? I mean, when you are in the Scratchpad or things like that and you are actually writing the file in the braille display. Is it possible to do it in computer braille?

James Bowden: I have to be honest and say I don't know the answer because I don't actually have a Focus braille display, but I believe the answer is no. I am very happy to be corrected on that.

Teresa Arroyo: I see. So, when you say you can do input--

James Bowden: This is talking about with a screen reader and so on, if you have it connected to a computer.

Teresa Arroyo: So, when you are in the computer, but you actually write through the computer's keyboard and the output comes on the braille display, right?

James Bowden: Or the other way round. If you have the braille display attached to the computer and you use the buttons on the braille display and write on the computer that way. I should have made that clear, I'm sorry.

Teresa Arroyo: Oh, so you can write into your computer through braille display?

James Bowden: You can, yes, with most screen readers.

Teresa Arroyo: Do you know if this works with a Focus?

James Bowden: You should be able to, yes.

Teresa Arroyo: Okay.

James Bowden: We've just had an answer from Carla, I think, who says, "Yes, you can use computer braille in the Scratchpad. You save it as text." Thanks, Carla.

Teresa Arroyo: Thank you. That means then if I write in computer braille on my braille display, if I then print that document, would the letters come as they should, in print?

James Bowden: It'll be exactly what you write, one character, one character, so don't use any braille contractions.

Teresa Arroyo: No, okay. Thank you.

James Bowden: And remember to use dot 7 for a capital.

Teresa Arroyo: Yes. That's why I was asking because I use computer braille for output between my computer and what I read from the computer into my braille display. So I was wondering if I could do the same in writing.

James Bowden: Carla says yes.

Ben Mustill-Rose: We're going to come to Tracy next.

Tracy Mousseau: I was going to confirm what Carla said. Almost all braille displays, if you're hooked up to the computer, you can either use the braille keys or use the QWERTY keyboard.

James Bowden: Yes. Thank you, Tracy.

Ben Mustill-Rose: Always good to get confirmation. We have Lindsey with her hand raised.

Lindsey Rowlands: I'm just checking that this will all be on the handout afterwards, just because I've never used computer braille. I learned braille in the 70s and I've only just got myself a note taker. So this is all new and I'm a bit lost.

James Bowden: All that I've said tonight is on the handout, which will be available from the Braillists website, braillits.org/media.

Lindsey Rowlands: Brilliant. Okay, that's lovely, thank you.

James Bowden: Give us a day or two to get it up.

 So, the only other thing I was going to say, really, is if you want to find out more information, we've already mentioned the handout here. You can find full charts of the USA Computer Code and there's even actually one on Wikipedia, if you type in computer braille, it'll come up with results for you and there is a chart which includes braille characters and so on.

 The BANA website, Braille Authority of North America, and I said North America because this is the USA computer code, also has a page on computer braille with documents you can download. Be careful, because that does also include the signs with prefixes that you use on paper braille, so just make sure you look at the eight-dot bit if you're looking at braille displays.

 I'm sure there are various charts on several other websites.

 Of course, I also mentioned a good way of just finding out what things are is just typing characters on your keyboard and finding out what they are by what the screen reader says. So, if, for example, I type in dots 5 6 and the screen reader will say "semi-colon" when I cursor back over it. Or an A-R sign and it will come out as a "greater than" etc.

 Sometimes it's an easy way just to actually bash at the keyboard and find out what things are.

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